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Author: Mr. Alish Nazarov
Azerbaijan State Oil and Industry University (ASOIU), Azerbaijan

# OPTIMIZING MOBILE LAUNCH PLATFORM MAINTENANCE VIA A DSS INTEGRATING Z-DEMATEL AND Z-VIKOR

**Abstract**

Mobile launch platforms are critical to the logistics of space missions, yet their maintenance is challenged by dynamic operating conditions and uncertain performance data. This paper presents a Decision Support System (DSS) that integrates Z-DEMATEL and Z-VIKOR methodologies to optimize maintenance scheduling for mobile launch platforms. Expert assessments—captured as Z-numbers—are employed to reflect uncertainty and reliability regarding maintenance factors such as mechanical integrity, environmental exposure, and logistical constraints. The Z-DEMATEL technique is used to model and quantify the causal relationships among these criteria, elucidating the complex interdependencies that impact maintenance outcomes. Building on this analysis, the DSS utilizes the Z-VIKOR method to rank maintenance tasks by seeking a balanced compromise that addresses conflicting objectives and inherent uncertainties. A case study involving a mobile launch platform demonstrates that the integrated approach significantly improves task prioritization and resource utilization, thereby enhancing operational reliability and reducing risks. Sensitivity analysis confirms the robustness of the decision model across various scenarios. In summary, this study provides substantive technical and programmatic evidence that the proposed DSS offers a scalable and reliable solution for optimizing maintenance strategies in dynamic space infrastructure environments, ultimately contributing to safer and more efficient mission operations.